NASA Facts

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For Release

International Space Station
Creating a World-Class Orbiting Laboratory

The International Space Station, is a clear demonstration of U.S. leadership of the Global community, lighting the pathway for peaceful cooperation between nations in the 21st Century. The largest international scientific and technological endeavor ever undertaken, is taking shape in factories and laboratories in the U.S. and around the world. With the Space Station, a permanent laboratory will be established in a realm where gravity, temperature, and pressure can be manipulated to achieve a variety of scientific and engineering pursuits that are impossible in ground-based laboratories. The Space Station will be a test bed for the technologies of the future and a laboratory for research on new, advanced industrial materials, communications technology, medical research and much more. On orbit assembly will begin this summer, with a new star appearing in the night sky and growing brighter as each international contribution is delivered to space.

Program

The International Space Station will be a permanent orbiting laboratory in space capable of performing long-duration research in the unique environment of Earth's orbit. The Space Station will:

- expand U.S. leadership of the global community
- forge new partnerships with other nations for the benefit of humankind
- serve as a driving force for emerging technologies
- inspire our children and encourage education
- foster the next generation of scientists, engineers, and entrepreneurs
- satisfy humanity's need to explore

Aboard this international orbiting laboratory, astronauts from many nations will:

- advance medical research, benefiting all humankind
- develop new materials and processes to benefit industries on Earth
- accelerate breakthroughs in technology and engineering that will have

immediate, practical applications for life on Earth and will create jobs and economic opportunities worldwide.

Assembly of the Space Station will begin in June 1998 and will be completed in 2003. In orbit 220 miles above the Earth, the Space Station will circle the globe at an inclination of 51.6 degrees to the equator. This orbit has two advantages:

- It can be reached by the launch vehicles of all the international partners, providing a robust capability for the delivery of crews and supplies to the Station.
- It provides excellent Earth observation with coverage of 85 percent of the globe and over flight of 95 percent of the planet's population.

When completed, the Space Station will be 356 feet across and 290 feet long. It will weigh about 950,000 pounds. Up to seven people will live on the Space Station.

Phase One: The Shuttle-Mir Program

In preparation for the 1998 assembly and operations of the International Space Station, NASA and the Russian Space Agency are cooperatively using the U.S. Space Shuttle and the Russian Space Station Mir to provide technology demonstrations, risk mitigation, operational experience, and early science opportunities. When the Shuttle-Mir program ends in May 1998, the U.S. will have had a continuous presence on Mir for almost 27 months. American astronauts who served a tour on Mir include: Norm Thagard, Shannon Lucid, John Blaha, Jerry Linenger, Michael Foale, David Wolf and Andy Thomas.

Phase One Results

The Shuttle-Mir program provided the U.S. with the opportunity to conduct long-term experiments in microgravity for durations far beyond the capability of the Shuttle. The flight of Americans astronauts and more than 140 experiments on Mir have become an important precursory step in preparing for Space Station assembly and research. The Shuttle-Mir science results include:

- Microgravity Science - Used cutting edge technology to dramatically increase number of protein crystals grown -- 30 times more than conventional techniques. Significantly expanded in-flight tissue culture experiments from weeks to months.
- Life Sciences - Significant data has been collected regarding human response to long-duration exposure to the microgravity environment. Bone loss rate does not lessen over time (1.2% lower hip/spine per month).
- Plant Growth - Seeds from plants grown in space have been planted and seeds harvested. This is a key requirement for self-sufficiency in

extended space habitation.

Actual space operations on Mir have identified areas on the International Space Station where existing designs should be improved, such as:

- Analysis of the events following the Mir fire resulted in a modification to the Station's software so that all intermodule ventilation can be shut off with a single command.
- Mir rendezvous and docking demonstrated that the planned use of the Shuttle "star trackers" requires the addition of Space Station track lighting for proximity operations.

Phases Two and Three: The Development, Assembly, and Operations of the International Space Station

The next phases of the International Space Station program are rapidly becoming a reality. As the launch of the first element of the Space Station approaches, the program is dealing with a myriad of hardware details—these include qualification and development testing on a major scale, the completion of flight components, developing and release of key software and the challenge of bringing all these activities together to ensure the timely delivery of components and modules to the Kennedy Space Center for processing, testing, and integration with the Space Shuttle in preparation for launch.

- The U.S. has the responsibility for developing and ultimately operating major elements and systems aboard the Space Station. The elements include three nodes, a laboratory module, truss segments, four solar arrays, a habitation module, three pressurized mating adapters, a cupola, an unpressurized logistics carrier and a centrifuge module. The various systems being developed by the U.S. include thermal control, life support, guidance, navigation and control, data handling, power systems, communications and tracking, ground operations facilities and launch-site processing facilities.
- The first element to be launched is a control module (FGB), a 20-ton, 43-foot-long module that contains propulsion, command and control systems. Being built for NASA by the Russian corporation Krunichev, it is on schedule for a Proton launch from the Baikonur Cosmodrome in Kazakstan in June 1998.
- As of January 1998, about 280,000 pounds of flight-quality hardware had been built.
- The first U.S. pressurized module (Node 1) of the Space Station is being outfitted at the Kennedy Space Center for its July 1998 flight.

The international partners, Canada, Japan, the European Space Agency, and Russia will contribute the following key elements to the Space Station:

- Canada is providing a 55-foot-long robotic arm to be used for assembly and maintenance tasks on the Space Station.
- The European Space Agency is building a pressurized laboratory and

logistics transport vehicles to be launched on the Ariane V launch vehicle.

- Japan is building a laboratory with an attached exposed facility and logistics transport vehicles.
- Russia is providing research modules, a service module with its own life support and habitation systems, a science power platform that supplies about 20 kilowatts of electrical power, logistics transport vehicles, and Soyuz spacecraft for crew return and transfer.

Future Activities: Science Operations

- The Space Station will provide scientists the electric power and lab space on orbit to perform research on such things as the growth of protein crystals, which aid in determining the structure and function of proteins. Such information will greatly enhance drug design and research in the treatment of diseases. Crystals already grown on the Space Shuttle are superior to anything grown on Earth for research into cancer, diabetes, emphysema, parasitic infections, and immune system disorders.
- The almost complete absence of gravity on the Space Station will allow new insights into human health and disease prevention and treatment, including heart, lung, and kidney function, cardiovascular disease, osteoporosis (bone loss), hormonal disorders, and brain function.
- Onboard, crew members will study material processes that cannot take place on Earth because of the overwhelming influence of gravity. Materials to be investigated include polymers (used on Earth for everything from paint to contact lenses), semiconductors for high-speed super computers and electronics, and high-temperature superconductors that will make electrical devices operate more efficiently.
- The Space Station will inspire a new generation of Americans to explore and achieve, pioneering new methods of education to teach and motivate the next generation of scientists, engineers, entrepreneurs, and explorers.

Summary

Significant progress has been made on this international partnership. The design and development of the first three U.S. flights is largely complete and these flights are well into integration and qualification testing. Within the year all the hardware and software elements for these flights will be delivered to the Kennedy Space Center, FL, for integration and checkout prior to flight. The first Space Station flight to be launched, the U.S. funded-Russian built control module (FGB) will be delivered soon to its launch facility at Baikonur, Kazakstan. During the next year, the next series of U.S. flight elements also will be completing manufacturing and outfitting and will begin qualification testing.

The first U.S. launch to begin assembly of the International Space Station will soon be accomplished and the newest star in the night sky will continue to grow bright, demonstrating to the World that its nations can work together on peaceful initiatives.

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